

Original Research

Perceived Emotional Intelligence in Colombian Adolescents: Psychometric Properties of the Trait Meta-Mood Scale TMMS-24

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Abstract

Background: The Trait Meta-Mood Scale (TMMS-24) assesses beliefs, thoughts, and attitudes based on attention, clarity, and emotional repair. **Methods:** The aim of this study was to analyze the psychometric properties of the TMMS-24 in two samples of Colombian adolescents aged 14 to 19: 404 school adolescents ($M = 15.5$, $SD = 1.29$; 47.8% female) and 404 offenders ($M = 16.6$, $SD = 1.04$; 17.3% female). Self-report measures of emotional intelligence, socioemotional competencies, empathy, and prosocial behavior were applied. Factorial validity was assessed using Confirmatory Factor Analysis (CFA). Construct validity was established through correlations with socioemotional competence, empathy, and prosocial behavior, while criterion validity was evaluated by predicting prosocial behavior. **Results:** The analyses confirmed the original three dimensions of the scale, showing satisfactory reliability and evidence of both construct and criterion validity. The CFA indicated adequate fit indices in both samples. **Conclusions:** The findings suggest that the TMMS-24 is a valid instrument for assessing emotional intelligence in Colombian adolescents in educational and penitentiary settings.

Keywords: emotional intelligence; criminal behavior; prosocial behavior; empathy; confirmatory factor analysis; TMMS-24

La Inteligencia Emocional Percibida en Adolescentes Colombianos: Propiedades Psicométricas de la “Escala Rasgo de Metaconocimiento Emocional” TMMS 24

Resumen

Antecedentes: La “Escala rasgo de metaconocimiento emocional” (*Trait Meta-Mood Scale* TMMS-24) evalúa creencias, pensamientos y actitudes basadas en la atención, claridad y reparación emocional. **Métodos:** El objetivo de este estudio fue analizar las propiedades psicométricas de la TMMS-24 en dos muestras de adolescentes colombianos de entre 14 y 19 años: 404 adolescentes escolares ($M = 15,5$; $DT = 1,29$; 47,8% mujeres) y 404 infractores ($M = 16,6$; $DT = 1,04$; 17,3% mujeres). Se aplicaron autoinformes sobre inteligencia emocional, competencias socioemocionales, empatía y conducta prosocial. La validez factorial se evaluó mediante análisis factorial confirmatorio (AFC). La validez de constructo se estableció mediante correlaciones con competencia socioemocional, empatía y conducta prosocial, mientras que la validez de criterio se evaluó prediciendo la conducta prosocial. **Resultados:** Los análisis confirmaron las tres dimensiones originales de la escala, mostrando una fiabilidad satisfactoria y evidencias de validez de constructo y de criterio. El AFC indicó índices de ajuste adecuados en ambas muestras. **Conclusiones:** Los hallazgos sugieren que la TMMS-24 es un instrumento válido para evaluar la inteligencia emocional en adolescentes colombianos en entornos educativos y penitenciarios.

Palabras Claves: inteligencia emocional; conducta delictiva; comportamiento prosocial; empatía; análisis factorial confirmatorio; TMMS-24

1. Introduction

The Trait Meta Mood Scale (TMMS-24) (Salovey et al, 1995) is a self-report measure based on the ability model of emotional intelligence (Salovey and Mayer, 1990). The authors define Emotional Intelligence (EI) as “The ability to reason validly with emotions and with emotion-related information, and to use emotions to enhance thought” (Mayer et al, 2016, p. 296). The development of EI makes it possible to identify emotional content in social interactions and subjective experience, favors the ability to express emotions with greater precision, facilitates thinking by resorting to emotions, and helps with the management of one’s own emotions and those of others (Mayer et al, 2016; Salguero et al, 2010). The TMMS-24 has demonstrated strong and reliable psychometric properties across different populations, including adults (Delhom et al, 2017; Górriz et al, 2021) and adolescents (Cámara et al, 2023; Patti-Signorelli and Romero-Díaz de la Guardia, 2023). Its use has grown rapidly, with translations available in at least five languages, and it is widely applied in clinical, educational, and organizational studies (Townshend, 2023). Research has shown that the TMMS-24 is effective in analyzing the relationship between EI and various aspects of well-being, such as mood states, life satisfaction, and psychological well-being (Delhom et al, 2017; Delhom et al, 2023; Górriz et al, 2021). It has also proven valuable for evaluating intervention programs’ effectiveness in improving well-being and social adjustment (Puertas-Molero et al, 2020; Villegas-Lirola, 2024).

Based on the EI skills model (Mayer et al, 2016), programs have been developed that help improve adolescents’ social adjustment, interpersonal relationships, and subjective well-being (Castillo et al, 2013; Salguero et al, 2012). The TMMS-24 is a scale used to evaluate EI programs (Sigüenza Marín et al, 2019) and could be useful for evaluating interventions in Colombia. It is currently possible to find validations of EI scales in Colombia but from other theoretical perspectives (Navarro-Roldán et al, 2023). Due to the importance of EI, validated instruments that measure the construct and are useful for evaluating the impact of EI programs aimed at adolescents in the country are required.

Some EI studies have focused on designing valid measurement instruments (O’Connor et al, 2019). The most widely recognized assessment measures of the EI skill model are the Mayer-Salovey-Caruso Emotional Intelligence Test, MSCEIT (execution or performance test based on the ability model) (Mayer et al, 2001, 2002), and the TMMS (self-report based on the ability model) (Salovey et al, 1995). It has been indicated that “the Self-Report ability model, like the performance-based ability model, conceptualizes EI as a set of emotional aptitudes, but uses self-reports to measure the construct, where participants report their subjective beliefs about their own EI. The TMMS is the best-known test self-report of this model” (Gómez-Leal et al, 2018, p. 2).

The original TMMS (Salovey et al, 1995) has 48 items distributed in three dimensions: attention, clarity, and emotional repair. Fernández-Berrocal et al (2004) provided the Spanish adaptation of the TMMS, which preserved the original scale’s three dimensions. In adolescents, it has been adapted and validated in Spain (Martín-Albo et al, 2010; Pedrosa et al, 2014; Salguero et al, 2010), Mexico (Valdivia-Vázquez et al, 2015), Chile (Gómez-Núñez et al, 2020) and Brazil (Câmara et al, 2023). The evidence suggests that it is a reliable self-report measure of EI and presents characteristics recommended in the measurement of the construct, including the invariance by gender (Gómez-Núñez et al, 2020; Martín-Albo et al, 2010; Pedrosa et al, 2014). Other EI models are recognized; for example, the trait model considers EI a personality characteristic (O’Connor et al, 2019; Petrides and Furnham, 2001), and the mixed model considers it a set of skills and traits (Bar-On, 2006).

EI is a psychological construct associated with socio-emotional development, interpersonal relationships, and subjective well-being (Guerra-Bustamante et al, 2019; Martín-Albo et al, 2010; Nguyen et al, 2019). In adolescents, factors in EI are related to other variables such as empathy (Fernández-Abascal and Martín-Díaz, 2019; Salovey et al, 2002) and to personality factors such as extroversion, awareness, and openness to experience (Salguero et al, 2010). Relationships with self-esteem have also been observed (Gomez-Baya et al, 2016; Martín-Albo et al, 2010) and prosocial behavior (Morón et al, 2018). It has been reported that adolescents with high levels of perceived EI show higher prosocial attitudes related to social competence, such as helping and collaboration, social sensitivity, and prosocial leadership (Jiménez and López-Zafra, 2011).

EI has been observed to predict self-esteem and life satisfaction (Guasp Coll et al, 2020), self-concept (Martínez-Monteagudo et al, 2021), social adjustment, subjective well-being, and happiness (Guerra-Bustamante et al, 2019). EI has been shown to favor prosociality (Martin-Raugh et al, 2016). EI has also been observed as a mediator of prosocial behavior (Batoool and Lewis, 2022). Research indicates that adolescents with the most significant EI development have less aggressive behaviors (Antoñanzas, 2021). Adolescents with greater emotional clarity have been observed as being less likely to attack their sentimental couples (Fernández-González et al, 2018), and those with less emotional repair and empathy engage in more violence against their peers at school (Estévez et al, 2019). It has also been reported that EI can moderate antisocial behaviors when associated with other variables. For example, it has been indicated that emotional regulation and positive personality traits favor prosociality (Côté et al, 2011). A frequent observation in comparative studies between adolescent offenders and non-offenders is poorer EI skills among the offenders (Contreras and Cano, 2016; Hayes and Reilly, 2013). The evidence suggests that EI skills reduce antisocial behaviors (Kahn et al, 2016; Megías et al, 2018).

Some Colombian studies present good reliability values for the TMMS-24, but the analyses were exploratory (Perdomo et al, 2011; Rodríguez de Alba and Suárez-Colorado, 2012). We identified a validation of TMMS-24 for the Colombian population utilizing exploratory factor analysis (EFA) in university teachers, with a solution of 20 items distributed in the three original factors (Angulo and Albarracín, 2018). There was no evidence in the literature of CFAs of the TMMS-24 for Colombian adolescents. The studies available in Colombia that have evaluated EI have used the version validated in Spain (e.g., Gómez-Tabares et al, 2023; Perdomo et al, 2011).

The present study analyzes the psychometric properties of the TMMS-24 in two groups of Colombian adolescents: offenders and non-offenders. Although it is a widely used instrument in Colombia, there is no evidence of CFAs of the instrument. When designing the research, we decided to include two samples with different characteristics to evaluate the psychometric properties of the TMMS-24, hypothesizing that the results would be similar in both samples. The sample of juvenile offenders is particularly relevant because these youths often exhibit behavioral and emotional problems, making it crucial to promote and develop socio-emotional competencies in this population (Curci et al, 2016; Gómez-Leal et al, 2021).

We expected to obtain evidence of reliability, factorial, construct, and criterion validity (predictive and concurrent). Consistent with all previous validation studies AND factor analysis of the TMMS-24, we expect the three-factor structure to be repeated in the two groups. The results can be useful in evaluating the EI of adolescents and help to measure the effectiveness of the programs involved in the development of EI. It is important to note that, in several countries, psychometric analyses of the TMMS-24 have been conducted recently with both adolescents (Gómez-Núñez et al, 2020; Cámara et al, 2023; Patti-Signorelli and Romero-Díaz de la Guardia, 2023) and adults (Górriz et al, 2021).

The general hypothesis is that the TMMS-24 exhibits adequate psychometric properties (reliability and factorial, construct, and criterion validity) for assessing perceived emotional intelligence in Colombian adolescents in educational and penitentiary contexts. The specific hypotheses were: (1) The three original dimensions of the TMMS-24 (emotional attention, emotional clarity, and emotional repair) will be replicated in Colombian adolescents, and acceptable fit indices will be obtained in the Confirmatory Factor Analysis (CFA) for the samples of the offender and non-offender adolescents; (2) The TMMS-24 factors will have significant and positive correlations with variables associated with emotional intelligence, such as empathy and prosocial behavior, confirming its construct and criterion validity (concurrent) by correlating with the *Emotional Skills and Competence Questionnaire* (ESCQ-21); and (3) The TMMS-24 dimensions will significantly predict proso-

cial behavior in both samples, providing evidence of criterion validity (predictive).

2. Method

2.1 Participants

In this study, 808 adolescents between 14 and 19 participated, distributed in two groups: offenders and non-offenders. Adolescents between the ages of 14 and 19 can receive sanctions or socio-educational measures for delinquent behavior as minors in Colombia and other countries. According to the World Health Organization (WHO), this age range corresponds to late adolescence. Inclusion criteria were age (14–19), sufficient schooling to read, write, and understand the questions, and no serious psychiatric disorders. The criteria were verified using a checklist reviewed with the school counselors of the schools and psychosocial teams of the socio-educational care centers.

The first group was 404 adolescent offenders receiving legal sanctions from the Sistema de Responsabilidad Penal para Adolescentes (SRPA) in Colombia ($M_{\text{age}} = 16.6$, $SD = 1.04$); 17.3% were girls. They were prosecuted for simple and aggravated theft (49.5%), drug manufacture and trafficking (20.6%), and crimes against the person, including robbery with violence (5.6%), attempted murder (2.7%), and homicide (3.2%). The second group comprised 404 students enrolled in public and private educational institutions ($M_{\text{age}} = 15.5$, $SD = 1.29$), and 47.8% were girls. The participants of the two groups came from different geographical regions in Colombia (Antioquia, Caldas, Cauca, and Cundinamarca).

2.2 Instruments

(a) *Trait Meta-Mood Scale* (TMMS-24; Salovey et al, 1995); Spanish version (Pedrosa et al, 2014; Salguero et al, 2010). The TMMS-24 assesses people's meta-knowledge about their emotional abilities and comprises 24 items, with three group factors, each with eight items: attention (e.g., "Let my feelings interfere with what I am thinking"), clarity (e.g., "I am rarely confused about how I feel"), and emotional repair (e.g., "When I am upset, I think of all the pleasure of life"). It offers five alternative answers (1 = *strongly disagree*; 5 = *strongly agree*). High scores on the factors indicate a higher degree of EI. The scale's reliability in the sample of offenders and non-offenders was 0.93 and 0.90, respectively.

(b) *Emotional Skills and Competence Questionnaire* (ESCQ-21). The ESCQ-21 is an abridged questionnaire of the ESCQ (Faria et al, 2006; Takšić et al, 2009) that was adapted for Spanish adolescents (Schoeps et al, 2019). It is made up of 21 items and contains three subscales of seven items: (1) perceiving and understanding emotions, which assesses the ability to identify and discriminate emotions in one's own feelings, thoughts, and behaviors (e.g., "I notice when somebody feels down"); (2) expressing and labeling the emotion, which evaluates the ability to adequately ex-

press one's own emotional states and name them correctly (e.g., "I can easily name most of my feelings"); (3) managing and regulating the emotion, which refers to the ability to effectively readjust one's own emotions to achieve the desired result (e.g., "When somebody praises me, I work with more enthusiasm"). The scale offers six response alternatives, ranging from *never* (1) to *always* (6). High scores on the factors indicate a higher degree of emotional skills and competence. The reliability of the scale in the sample of offenders and non-offenders was 0.89 and 0.84, respectively.

(c) *Interpersonal Reactivity Index* (IRI; Davis, 1980); Spanish version by Mestre-Escrivá et al (2004). The IRI is a measure of empathy that has four subscales, each composed of 7 items: (1) perspective taking, which is the tendency to adopt the point of view of others spontaneously (e.g., "I try to look at everybody's side of a disagreement before I make a decision") (2) fantasy, which assesses the ability to transpose imaginatively to the feelings and actions of fictional characters in books, movies, and plays (e.g., "I daydream and fantasize, with some regularity, about things that might happen to me"); (3) empathic concern, which assesses feelings of sympathy and concern for unfortunate people (e.g., "Other people's misfortunes do not usually disturb me a great deal"); and (4) personal distress, which assesses personal feelings of anxiety and restlessness in tense interpersonal settings (e.g., "When I see someone get hurt, I tend to remain calm") (Davis, 1983). The Likert-type format of the scale has five response options: "Does not describe me very well" (1); "Does not describe me well" (2); "Describes me more or less" (3); "Describes me well" (4); and "Describes me very well" (5). High scores on the factors indicate a higher degree of empathy. The scale's reliability in the sample of offenders and non-offenders was 0.88 and 0.72, respectively.

(d) *Prosocial Behavior Scale* (PBS; Caprara and Pastorelli, 1993); Spanish version by Del Barrio et al (2001). The PBS is a measure of 15 items, with one factor, and its response format has three options: *often* (3), *sometimes* (2), and *never* (1). The items offer a description of behaviors that denote altruism, trust, and kindness (e.g., "I share things I like with my friends" and "I trust others"). High scores indicate a higher degree of prosocial behavior. The reliability of the scale was 0.71 in both groups.

2.3 Procedure

In this study, we used a cross-sectional design to analyze the psychometric properties of the TMMS-24. The Declaration of Helsinki's guidelines were considered during the data collection (World Medical Association, 2013). The study was approved by the University of Valencia Ethics Committee (No 1102812) and the Instituto Colombiano de Bienestar Familiar (ICBF, SIM 17615328-3). The socio-educational centers and schools that participated in the study were selected to ensure that the sample was representative of the country. Colombia's main cities, which

have socio-educational centers that serve juvenile offenders from various regions, were chosen. The cities included in the study were Bogotá, Medellín, Manizales, and Popayán, where the participating schools were also located. The formal request was submitted to the national headquarters of the ICBF, which issued the necessary approvals for the institutions in these regions. The directors of the socio-educational centers and schools had been contacted beforehand and had expressed their willingness to participate in the study. Once the corresponding authorizations were obtained, the required permits were processed, and the schedules and locations for data collection were coordinated. Before answering the questionnaires, the adolescents, parents, and family advocates gave their written consent and were informed about the investigation's purpose. Participation in the study was voluntary and anonymous.

A pilot test was conducted with 50 adolescents from each group to ensure that the adolescents adequately understood the questionnaire items. These participants were excluded from the final analysis. Additionally, two focus groups were conducted to ensure the adolescents correctly interpreted the questions. As a result of these activities, only one change was made: in TMMS-24, the word "angry" was translated to "enojado" in question 24 (Appendix Table 6). The questionnaires were answered during tutoring hours in teachers' and educators' presence and the research team. Printed forms were used, and the average completion time was 30 minutes.

2.4 Data Analysis

First, a descriptive analysis of each study factor was carried out, including the mean, the standard deviation, and the reliability. These were carried out with the SPSS program (version 25.0, IBM Corp., Armonk, NY, USA). To establish the psychometric properties of the TMMS-24 questionnaire, it was analyzed using confirmatory factor analysis (CFA) for the two groups of adolescent offenders and non-offenders. The EQS program (version 6.2, Multivariate Software, Inc., Encino, CA, USA) (Bentler, 2006) was used for the CFA. The robust maximum likelihood (ML) estimation was applied following Finney and DiStefano (2013). The Satorra-Bentler scaled chi-square method was used (Satorra and Bentler, 2001).

The goodness of fit analysis was based on the following robust indices (Brown, 2015): the robust comparative fit index (R-CFI >0.95 good fit and >0.90 acceptable fit), and the Tucker-Lewis index (TLI >0.90 good fit). The mean squared error of approximation was calculated to analyze the discrepancy between the hypothetical model and the covariance matrix of the population data (R-RMSEA <0.05 good fit, and <0.08 reasonable fit) (Harrington, 2009). The standardized root mean square residual, which is a summary of the mean covariance residuals, was also verified (SRMR <0.10 good fit) (Kline, 2005). The convergent validity, the average levels of variance ex-

Table 1. Descriptive statistics on offenders and non-offenders.

Subscale/Item	Juvenile offenders (<i>n</i> = 404)				Non-offenders (<i>n</i> = 404)			
	M	SD	Skewness	Kurtosis	M	SD	Skewness	Kurtosis
Attention	24.85	7.74	-0.14	-0.72	26.86	7.07	-0.16	-0.64
1	3.07	1.25	0.09	-1.11	3.50	1.12	-0.29	-0.95
2	3.38	1.26	-0.27	-1.01	3.52	1.14	-0.33	-0.84
3	3.01	1.34	-0.04	-1.27	3.23	1.27	-0.07	-1.18
4	3.50	1.28	-0.50	-0.85	3.67	1.23	-0.48	-0.94
5	2.84	1.38	0.18	-1.27	3.29	1.28	-0.14	-1.14
6	2.99	1.35	0.03	-1.22	3.13	1.21	0.04	-0.98
7	2.95	1.25	-0.06	-1.04	3.25	1.22	-0.14	-1.26
8	3.10	1.27	-0.05	-1.09	3.36	1.22	-0.11	-1.02
Clarity	25.62	7.46	-0.25	-0.77	25.15	6.82	0.02	-0.54
9	3.47	1.24	-0.30	-1.03	3.18	1.24	-0.05	-1.07
10	3.27	1.24	-0.23	-1.00	3.04	1.10	0.13	-0.71
11	3.08	1.29	-0.09	-1.15	3.40	1.13	-0.18	-0.99
12	3.24	1.23	-0.17	-1.03	3.24	1.23	-0.17	-1.03
13	3.21	1.16	-0.17	-0.75	3.46	1.09	-0.23	-0.79
14	2.99	1.41	0.00	-1.30	2.79	1.22	0.36	-0.85
15	2.95	1.24	0.10	-1.06	2.95	1.07	0.23	-0.74
16	3.21	1.24	-0.13	-1.00	3.05	1.20	0.11	-1.00
Repair	27.38	7.53	-0.43	-0.69	27.84	6.97	-0.24	-0.78
17	3.41	1.31	-0.36	-1.04	3.18	1.24	-0.05	-1.07
18	3.47	1.23	-0.41	-1.06	3.04	1.10	0.13	-0.71
19	3.27	1.40	-0.21	-1.26	3.40	1.13	-0.18	-0.99
20	3.46	1.30	-0.37	-1.04	3.24	1.23	-0.17	-1.03
21	3.10	1.26	-0.0	-1.05	3.46	1.09	-0.23	-0.79
22	3.33	1.33	-0.31	-1.15	2.79	1.22	0.36	-0.85
23	4.18	1.12	-1.20	-0.33	2.95	1.07	0.23	-0.74
24	3.16	1.40	-0.11	-1.33	3.05	1.20	0.11	-1.00

tracted (AVE) (good indicators ≥ 0.40), and the composite reliability coefficient (CRC) were estimated, where scores above 0.70 are considered adequate (Hair et al, 2019).

Following the proposal of Meneses et al (2013) and Fenn et al (2020) for analyzing the construct validity, Pearson correlations were performed with associated variables (in this case, EI) with empathy (assessed with the IRI) and prosocial behavior (assessed with the PBS). A hierarchical multiple regression analysis was performed with prosocial behavior as the dependent variable to examine the criterion validity, i.e., the ability of the TMMS-24 to predict other constructs (predictive validity). The criterion validity was complemented with a concurrent analysis to establish the correspondence between the instrument's measurements and other scales that measure the same factors; this was done by correlating the three subscales of the TMMS-24 with the three subscales of the ESCQ-21; both self-reports are based on the EI theory of ability (Salovey and Mayer, 1990); other studies have performed criterion validation using the same procedure (Schoeps et al, 2019).

3. Results

3.1 Descriptive Results

Normality tests were performed using the Kolmogorov-Smirnov statistical test, which indicated that the data did not have a normal distribution. Table 1 shows the descriptive results. We analyzed whether there was a difference in the scores of the three TMMS 24 variables between adolescent offenders and non-offenders, and a statistically significant difference was observed only in emotional attention, $t(806) = 3.850$, $p < 0.001$, 95% CI [0.98, 3.03].

3.2 Confirmatory Factor Analysis

Before the CFA, exploratory analyses were performed by fixing one-, two-, three- and four-factor distributions. The results indicated that the established three-factor structure presented the best indicators and the most variance explained. In the CFA, the three factors of the scale were each fixed with eight items, and the robust estimate of Maximum Likelihood (ML) was used. The results for three factors and 24 items in the goodness of fit indices were satisfactory in both groups. The comparison between the one-factor model and the three-factor model showed that the latter better fit the data.

Table 2. Reliability coefficients for TMMS-24 subscales and items on offenders and non-offenders.

Subscale/Item	Juvenile offenders (<i>n</i> = 404)			Non-Offenders (<i>n</i> = 404)		
	r_{jx}	$\alpha-x$	Factor loadings CFA	r_{jx}	$\alpha-x$	Factor loadings CFA
Attention	$(\alpha = 0.87; AVE = 0.53; CRC = 0.90)$			$(\alpha = 0.87; AVE = 0.46; CRC = 0.87)$		
1	0.73	0.93	0.75	0.60	0.90	0.67
2	0.66	0.93	0.73	0.61	0.90	0.74
3	0.63	0.93	0.68	0.56	0.90	0.72
4	0.68	0.93	0.73	0.66	0.90	0.76
5	0.38	0.93	0.38	0.26	0.90	0.40
6	0.65	0.93	0.72	0.42	0.90	0.64
7	0.67	0.93	0.77	0.53	0.90	0.72
8	0.73	0.93	0.81	0.66	0.90	0.75
Clarity	$(\alpha = 0.88; AVE = 0.48; CRC = 0.88)$			$(\alpha = 0.88; AVE = 0.47; CRC = 0.87)$		
9	0.67	0.93	0.73	0.65	0.90	0.76
10	0.73	0.93	0.81	0.64	0.90	0.77
11	0.67	0.93	0.74	0.62	0.90	0.77
12	0.65	0.93	0.58	0.46	0.90	0.45
13	0.60	0.93	0.66	0.62	0.90	0.60
14	0.63	0.93	0.64	0.62	0.90	0.70
15	0.66	0.93	0.66	0.55	0.90	0.58
16	0.70	0.93	0.71	0.62	0.90	0.77
Repair	$(\alpha = 0.86; AVE = 0.45; CRC = 0.87)$			$(\alpha = 0.86; AVE = 0.45; CRC = 0.86)$		
17	0.60	0.93	0.64	0.59	0.90	0.84
18	0.65	0.93	0.80	0.60	0.90	0.87
19	0.59	0.93	0.69	0.54	0.90	0.72
20	0.61	0.93	0.76	0.58	0.90	0.83
21	0.64	0.93	0.70	0.47	0.90	0.50
22	0.67	0.93	0.57	0.63	0.90	0.54
23	0.59	0.93	0.56	0.46	0.90	0.41
24	0.55	0.93	0.62	0.47	0.90	0.45

Note: r_{jx} = scale-item correlation; $\alpha-x$ = reliability if the item is deleted; AVE = average variance extracted; CRC = compound reliability coefficient.

The goodness-of-fit indices for the three-factor models of the TMMS-24 in offender adolescents were: ($SB\chi^2 = 577.11$; $df = 246$; $p < 0.001$); TLI = 0.922; CFI = 0.931; R-RMSEA = 0.06; CI 90% (0.052, 0.064); SRMR = 0.06; and for the non-offender adolescents were: ($SB\chi^2 = 628.07$; $df = 245$; $p < 0.001$); TLI = 0.900; CFI = 0.911; R-RMSEA = 0.06; CI 90% (0.056, 0.068); SRMR = 0.08.

3.3 Reliability

The reliability results in the two groups for the three TMMS-24 subscales were strong. The full-scale showed a reliability of 0.93 for offenders and a reliability of .90 for non-offenders. Table 2 presents each scale's reliability if the item is eliminated, the average extracted variance (AVE), and the composite reliability coefficient (CRC). The observed values indicate good reliability of the TMMS-24 (Hair et al, 2019). The reliability of the subscales of all the instruments evaluated for each subsample is presented in Tables 3,4.

3.4 Construct Validity

The construct validity was analyzed through correlations with other associated variables. A positive relationship was observed between attention, clarity, and emotional repair and the variables of empathy and prosocial behavior (Tables 3,4).

3.5 Criterion Validity

Moderate and high relationships were identified when performing a correlation analysis between the TMMS-24 factors and the three ESCQ-21 subscales, which evaluate perception, expression, and emotional regulation. These results justify the criterion validity of the TMMS-24 (concurrent) with other measures of socio-emotional competence (Tables 3,4). As for convergent validity, the square root of the AVE of the dimensions of the TMMS-24 present values higher than the correlation between factors, evidencing adequate indices.

Table 3. Correlations for Study Variables (Juvenile offenders; n = 404).

Variable	Range	$\bar{X}$	SD	α	1	2	3	4	5	6	7	8	9	10	11
1. Attention (TMMS-24)	8–40	24.85	7.74	0.88	-	(0.72)									
2. Clarity	8–40	25.62	7.46	0.88	0.67**	-	(0.69)								
3. Repair	8–40	27.38	7.53	0.87	0.56**	0.66**	-	(0.67)							
4. Perceive and Understand (ESCQ-21)	7–42	27.25	6.12	0.71	0.50**	0.60**	0.52**	-							
5. Express and label emotion	7–42	27.96	6.57	0.76	0.45**	0.53**	0.43**	0.71**	-						
6. Manage and regulate emotion	7–42	31.00	6.37	0.76	0.54**	0.65**	0.54**	0.78**	0.66**	-					
7. Perspective-Taking (IRI)	5–35	20.67	5.06	0.67	0.39**	0.43**	0.45**	0.41**	0.46**	0.44**	-				
8. Fantasy	5–35	19.63	5.62	0.67	0.36**	0.38**	0.29**	0.28**	0.34**	0.30**	0.57**	-			
9. Empathic Concern	5–35	19.50	5.32	0.68	0.33**	0.36**	0.31**	0.35**	0.37**	0.35**	0.64**	0.57**	-		
10. Personal Distress	1–35	18.82	5.26	0.70	0.36**	0.38**	0.36**	0.26**	0.32**	0.32**	0.61**	0.56**	0.73**	-	
11. Prosocial behavior (PBS)	10–30	22.68	3.61	0.71	0.32**	0.31**	0.26**	0.35**	0.38**	0.31**	0.47**	0.38**	0.36**	0.33**	-

Note: $\bar{X}$, Means; SD, standard deviation; α = Cronbach's alpha; AVE square root on the diagonal. ** $p < 0.01$.

Table 4. Correlations for Study Variables (Non-offenders; n = 404).

Variable	$\bar{X}$	SD	α	1	2	3	4	5	6	7	8	9	10	11
1. Attention (TMMS-24)	26.86	7.07	0.87	-	(0.68)									
2. Clarity	25.15	6.82	0.88	0.41**	-	(0.68)								
3. Repair	27.84	6.97	0.86	0.28**	0.49**	-	(0.67)							
4. Perceive and Understand Emotion (ESCQ-21)	29.11	4.79	0.58	0.36**	0.61**	0.48**	-							
5. Express and label emotion	30.98	5.07	0.68	0.31**	0.55**	0.34**	0.65**	-						
6. Manage and regulate emotion	31.37	5.12	0.66	0.22**	0.59**	0.60**	0.67**	0.49**	-					
7. Perspective-Taking (IRI)	23.36	4.38	0.66	0.29**	0.22**	0.31**	0.36**	0.30**	0.28**	-				
8. Fantasy	23.15	5.14	0.66	0.15**	-0.03	-0.02	0.05	0.10*	0.01	0.21**	-			
9. Empathic Concern	25.20	4.28	0.53	0.17**	-0.02	0.08	0.18**	0.23**	0.10*	0.34**	0.23**	-		
10. Personal Distress	18.71	4.93	0.68	0.02	-0.25**	-0.29**	-0.18**	-0.13**	-0.21**	-0.04	0.18**	0.12*	-	
11. Prosocial behavior (PBS)	25.63	3.33	0.71	0.06	0.22**	0.34**	0.39**	0.43**	0.43**	0.24**	0.15**	0.40**	-0.14**	-

Note: $\bar{X}$ = Means; SD = standard deviation; α = Cronbach's alpha; AVE = average variance extracted (square root on the diagonal). * $p < 0.05$. ** $p < 0.01$.

A hierarchical multiple regression analysis was performed for each group (Table 5) to analyze the criterion validity using prosocial behavior as the dependent variable. The sociodemographic variables of gender and age were introduced in the first step, and the dimensions of the TMMS-24 were introduced in the second step.

Among the offenders, the model with the sociodemographic variables is significant ($R^2 = 0.01$, $F = 2.953$, $p = 0.05$), but only the gender variable contributes to the explained variance ($\beta = -0.12$, $t = 2.359$, $p = 0.02$); in step two, the model is significant when the dimensions of the TMMS-24 are added ($R^2 = 0.14$, $F = 12.390$, $p < 0.001$). However, only attention contributes significantly to the explained variance ($\beta = 0.19$, $t = 2.959$, $p = 0.005$).

Among the non-offenders, the model with sociodemographic variables is not significant ($R^2 = 0.00$, $F = 0.066$, $p = 0.936$); the model is significant when adding the dimensions of the TMMS-24 ($R^2 = 0.14$, $F = 12.633$, $p < .001$). Gender ($\beta = 0.12$, $t = 2.500$, $p < 0.0001$), clarity ($\beta = 0.12$, $t = 2.101$, $p = 0.05$), and repair contribute significantly to the explained variance ($\beta = 0.33$, $t = 6.061$, $p < 0.001$). The EI variables showed an effect on prosocial behavior, which indicates the predictive validity of the TMMS-24 (Table 5).

4. Discussion

This study aimed to analyze the psychometric properties of TMMS-24 in Colombian adolescent offenders and non-offenders. The study's results support the general hypothesis that the TMMS-24 exhibits adequate psychometric properties (reliability and factorial, construct, and criterion validity) for assessing perceived EI in Colombian adolescents in educational and penitentiary contexts. The analyses confirmed the TMMS-24's three-factor structure, replicating the original proposal and previous validations in Spanish-speaking populations. Moreover, the indices obtained in both offender and non-offender adolescents endorse the instrument's applicability in both contexts, demonstrating its robustness and utility as an assessment tool.

Regarding the first hypothesis, the factor validity analyses permitted the identification and replication of a three-dimensional structure of TMMS-24 equal to that reported by the original authors (Salovey et al, 1995) and established in the TMMS-24 version developed for the Spanish population (Pedrosa et al, 2014; Salguero et al, 2010). In the CFA, the three-factor model with 24 items presented optimal indices in the sample of offending and non-offending adolescents.

The three-factor model of the TMMS-24 is consistent with other validations carried out in the Spanish-speaking adolescent population (Calero, 2013; Gómez-Núñez et al, 2020; Pedrosa et al, 2014; Salguero et al, 2010; Valdivia-Vázquez et al, 2015). The similarities in the resulting models can be considered to provide evidence for the existence of the trifactorial structure.

The reliability of the TMMS-24 was confirmed by showing good internal consistency indices for the three dimensions evaluated: attention, clarity, and repair. Results with high reliability are frequent in other validations of the TMMS-24 with adolescent populations (Gómez-Núñez et al, 2020; Valdivia-Vázquez et al, 2015). In this study, we analyzed psychometric properties in both the normative adolescent population and offenders, and we observed similar results for reliability regardless of the group. Some of the adjustment criteria, such as R-RMSEA and SRMR, are in the acceptable range, and adjustment indices with similar values in these indicators have been observed in other studies with the TMMS-24 (Gómez-Núñez et al, 2020; Salguero et al, 2010; Valdivia-Vázquez et al, 2015).

The correlations carried out to examine the construct validity indicated an association between EI factors and empathy, as had been hypothesized according to previous evidence (Fernández-Abascal and Martín-Díaz, 2019). Likewise, it can be said that the relationship of EI with prosocial behavior was verified (Martin-Raugh et al, 2016; Morón et al, 2018). The relationships identified between the variables of the TMMS-24 and the ESCQ-21 indicate criterion validity (concurrent), and the correlations presented relationship indexes are between moderate and high. These relationships between the two evaluation measures were observed in the CFA of the ESCQ-21 (Schoeps et al, 2019). These findings confirm the second hypothesis, indicating that the TMMS-24 factors exhibit significant and positive correlations with relevant EI variables and the ESCQ-21; this provides evidence supporting the validity of the TMMS-24 as a tool for assessing perceived EI.

The study also confirmed the third proposed hypothesis. The results obtained through hierarchical regression analyzing the effects of EI on prosocial behavior in both normative and offending adolescents provide evidence in favor of the (predictive) criterion validity of TMMS-24 (Martin-Raugh et al, 2016).

In general, this study provides evidence of the reliability, factorial validity, construct validity, and criterion validity of the TMMS-24. It offers a useful instrument for Colombian adolescents to self-report their perceived EI. The development of EI must be considered both in the educational context and in the intervention processes for offending adolescents. One of the relevant aspects in the intervention process of offending adolescents is to develop EI, among them, attention skills, understanding, and mainly emotional regulation; this could help improve their performance and well-being as evidenced in a normative population (Castillo et al, 2013; Puertas-Molero et al, 2020; Salguero et al, 2012).

This investigation has several weaknesses, including the fact that it is a cross-sectional study, which does not evaluate the stability of the measures. Furthermore, the data were collected through self-reports and biased by factors such as social desirability. The groups by gender are not

Table 5. Hierarchical Regression Results for prosocial behavior.

Variable	B	95% CI for B		SE B	β	R^2	ΔR^2
		LL	UL				
Juvenile offenders ($n = 404$)							
Step 1						0.01	0.01*
Constant	22.21***	21.30	23.125	0.46			
Gender	1.11*	0.18	2.044	0.47	0.12*		
Age	0.33	-0.63	1.302	0.49	0.03		
Step 2						0.13	0.12***
Constant	17.63***	16.09	19.161	0.77			
Attention	0.08**	0.03	0.14	0.03	0.19**		
Clarity	0.06	-0.002	0.13	0.03	0.13		
Repair	0.03	-0.029	0.09	0.03	0.06		
Non-offenders ($n = 404$)							
Step 1						0.00	0.00
Constant	25.57***	25.01	26.1	0.28			
Gender	0.12	-0.53	0.77	0.33	0.01		
Age	-0.007	-0.66	0.64	0.33	-0.001		
Step 2						0.14	0.14***
Constant	20.29***	18.59	21.99	0.863			
Attention	-0.03	-0.07	0.01	0.03	-0.06		
Clarity	0.05*	0.004	0.11	0.03	0.12*		
Repair	0.16***	0.10	0.20	0.03	0.33***		

Note: CI = confidence interval; LL = lower limit; UL = upper limit; SE B = standard deviation of Beta; β = standardized Beta; R^2 = coefficient of determination; ΔR^2 = change in coefficient of determination.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

equitable in offending adolescents, which can affect the results. On the other hand, invariance analyses that are important in this kind of study, are not offered. The ESCQ-21 was used to evaluate criterion (concurrent) validity; the instrument showed adequate reliability but has not been validated in the Colombian population; therefore, the results should be considered indicative and verified in future research.

The validation of instruments is a process that can be enhanced with additional analyses. In the case of TMMS-24, other variables can be included to support the validity of the criteria, such as analyzing the associations of EI with social skills (Salavera et al, 2019), less aggressive behaviors (Antoñanzas, 2021), and subjective well-being (Guerra-Bustamante et al, 2019; Salavera et al, 2020). Similarly, analysis based on the item response theory is possible (Pedrosa et al, 2014). Future research with Colombian adolescents may include validating other EI instruments based on performance, such as the MSCEIT (Mayer et al, 2002).

The validity and reliability of evidence obtained in the sample of offending and non-offending adolescents for a structure of three factors and 24 items indicate that the TMMS is a valid and reliable measure of EI that allows us to evaluate how Colombian adolescents perceive, understand, and regulate emotions. However, analysis with larger samples is recommended to confirm and complement the results of this study. The TMMS-24 could be a useful tool for pro-

fessionals and researchers when evaluating EI, comparing groups of adolescents, analyzing associated variables, and evaluating EI programs.

5. Conclusions

The findings of this study support the validity and reliability of the TMMS-24 for assessing perceived EI in Colombian adolescents, both in educational and penitentiary contexts. Confirmatory factor analysis confirmed the original three-factor structure (attention, clarity, and repair), with adequate fit indices in both groups. Internal consistency was high across all dimensions, and the scale showed evidence of construct validity through its significant associations with empathy and prosocial behavior. Additionally, the TMMS-24 demonstrated concurrent and predictive criterion validity, particularly in predicting prosocial behavior. These results suggest that the TMMS-24 is a useful scale for assessing EI in adolescents in Colombia and may contribute to the evaluation and design of interventions aimed at promoting emotional and social development.

Availability of Data and Materials

The research data supporting the findings of this article are available from the corresponding author upon reasonable request.

Table 6. Factors and items of the Trait Meta-Mood Scale (TMMS-24).

Factor 1: *Atención emocional* (Emotional attention)

1. *Presto mucha atención a los sentimientos* (I pay much attention to my feelings).
2. *Normalmente me preocupo mucho por lo que siento* (Usually I care much about what I'm feeling).
3. *Normalmente dedico tiempo a pensar en mis emociones* (I usually spend time thinking about my emotions).
4. *Pienso que vale la pena prestar atención a mis emociones y estado de ánimo* (I think it's worth paying attention to your emotions or moods).
5. *Dejo que mis sentimientos afecten a mis pensamientos* (I let my feelings interfere with what I am thinking)
6. *Pienso en mi estado de ánimo constantemente* (I think about my mood constantly).
7. *A menudo pienso en mis sentimientos* (I often think about my feelings).
8. *Presto mucha atención a cómo me siento* (I pay a lot of attention to how I feel).

Factor 2: *Claridad emocional* (Emotional clarity)

9. *Tengo claros mis sentimientos* (I am usually very clear about my feelings).
10. *Frecuentemente puedo definir mis sentimientos* (I am rarely confused about how I feel).
11. *Casi siempre sé cómo me siento* (I usually know my feelings about a matter).
12. *Normalmente conozco mis sentimientos sobre las personas* (I can make sense out of my feelings).
13. *A menudo me doy cuenta de mis sentimientos en diferentes situaciones* (I often aware of my feelings on a matter).
14. *Siempre puedo decir cómo me siento* (Always I can tell how I feel).
15. *A veces puedo decir cuáles son mis emociones* (Sometimes I can tell what my feelings are).
16. *Puedo llegar a comprender mis sentimientos* (I almost always know exactly how I am feeling)

Factor 3: *Reparación emocional* (Emotional repair)

17. *Aunque a veces me siento triste, suelo tener una visión optimista* (Although I am sometimes sad, I have mostly optimistic outlook).
18. *Aunque me sienta mal, procuro pensar en cosas agradables* (No matter how badly I feel, I try to think about pleasant things).
19. *Cuando estoy triste, pienso en todos los placeres de la vida* (When I am upset, I think of all the pleasure of life).
20. *Intento tener pensamientos positivos, aunque me sienta mal* (I try to think good thoughts no matter how badly I feel).
21. *Si doy demasiadas vueltas a las cosas, complicándolas, trato de calmarme* (If I find myself getting mad, I try to calm myself down).
22. *Me preocupo por tener un buen estado de ánimo* (I worry about being in too good a mood).
23. *Tengo mucha energía cuando me siento feliz* (I have much energy when I am happy).
24. *Cuando estoy enojado(a) intento cambiar mi estado de ánimo* (When I am angry, I don't usually let myself feel that way).

Author Contributions

AC, RG, and IM developed the idea and design of the research. IM managed the funding acquisition and project administration. AC, RG, and IM contributed to the methodology development and conducted the fieldwork. AC was responsible for the software implementation. AC performed the data curation and conducted the formal analysis and statistical procedures. IM supervised the entire process. RG and IM validated the procedures and results and supported the visualization and interpretation of the findings. AC wrote the original draft. All authors contributed to the review and editing of the manuscript, read and approved the final version, and participated sufficiently in the work, accepting responsibility for all aspects of the research.

Ethics Approval and Consent to Participate

The guidelines of the Declaration of Helsinki carried out the study. The research protocol was approved by the University of Valencia Ethics Committee (approval number: 1102812) and by the Instituto Colombiano de Bienestar Familiar – ICBF (approval number: SIM 17615328-3). Written informed consent was obtained from all participants and their parents or legal guardians prior to participation in the study.

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Conflict of Interest

The authors declare no conflict of interest.

Appendix

See Table 6.

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